

**Amendment Under 37 C.F.R. §1.111
U.S. Appln No. 10/528,559**

Atty Docket: Q86913

AMENDMENTS TO THE DRAWINGS

Figs. 7 and 8 have been labeled as “Prior Art”.

Attachment: Two Replacement Drawing Sheets (including Figs. 7 and 8)

REMARKS

Claims 1-4 are all the claims pending in the application. Claim 5 has been canceled without prejudice or disclaimer. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Drawings

The Examiner asserted that Figs. 1, 3, 7, and 8, should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. In response to this requirement, Applicants have amended in part, and traverse it in part, as follows.

Figs. 7 and 8 have been labeled as --Prior Art--, as suggested by the Examiner.

With respect to Figs. 1 and 3, Applicants submit that the "Prior Art" label is not necessary, and would not be accurate for the following reasons.

Although Fig. 1 apparently seems like Fig. 30 of the prior art (US Patent No. 6,751,538), it is a block diagram showing the whole constitution of the electric power steering apparatus according to the present invention.

That is, the substantial part of the present invention is a controller 100 of Fig. 1, wherein the details of such controller 100 are shown in Fig. 2. And Fig. 2 shows one embodiment consistent with the subject matter set forth in claim 1.

In other words, Fig. 1 is a drawing for explaining how an SAT estimating value calculated by the controller 100 is outputted to the motor 200 and operates the steering model 60 and the vehicle model 62. Also, Fig. 3 is a simplified drawing of Fig. 1.

Therefore, since both Figs. 1 and 3 are drawings explaining the present invention, instead of the drawings of only the prior art, the amendment of these drawings is not believed to be necessary.

Claim Objections

The Examiner objected to claim 5 as being of improper dependent form for failing to further limit the subject matter of a previous claim. Notwithstanding the impropriety of this objection, but only to expedite prosecution of this application, Applicants have canceled claim 5 without prejudice or disclaimer.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claim 1 under §112, 2nd paragraph, as indefinite. The Examiner noted specific instances of indefiniteness on page 3 of the Office Action. Applicants have amended claim 1 in a manner believed to overcome this rejection. Specifically, Applicants have amended claim 1 as follows.

As seen above, the word “design” indicated as vague under § 112 is amended as “tune” based on the disclosures in paragraphs [0022] and [0039]¹. The words, “being capable of doing”, indicated similarly as vague, have been deleted.

The acronym “SAT” indicated as indefinite is amended to further recite “a road surface reaction, i.e., self-align torque (SAT)” to make it clearer based on the disclosures in paragraph [0019] and the following explanations.

The definition of “SAT” estimated by an SAT estimating function is disclosed in paragraph [0029], Fig. 4 and Equation (1), and therefore, “SAT” in the present application means the “road surface reaction” generated in the steering shaft.

In light of the above, Applicants believe that this rejection has been overcome.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claim 1² under §103(a) as being unpatentable over US Patent 5,473,539 to Shimizu et al. (hereinafter Shimizu) in view of US Patent 6,527,079 to Takeuchi et

¹ References to the specification are given as paragraph numbers from the pre-grant publication US-2006-0017413-A1.

al. (hereinafter Takeuchi). Applicants respectfully traverse this rejection because the references fail to teach or suggest all of the elements as set forth and arranged in the claims.

Claim 1 sets forth, “an SAT estimating function” for estimating a road surface reaction, i.e., self-align torque (SAT) based on a balance of forces generated from a road surface to said steering shaft”. This element is discussed in the specification at, for example, paragraphs [0029], [0030] and [0033].

Additionally, the “torque filter” as presently claimed is, for example, disclosed in paragraph [0019] and Fig. 2, and is a filter for processing a torque signal from the torque sensor for detecting the steering torque of the steering wheel. That is, it is a filter for tuning the steering feeling Gsf to preferable characteristics (Please refer to paragraph [0039]).

On the other hand, the “actual assistive torque detecting means” of Shimizu, which was pointed out by the Examiner as corresponding to the “torque filter” as presently claimed, is a means for obtaining an actual assistive torque signal T_a based on the motor current I_M and the rotational angular speed θ_M' (Please refer to Shimizu at Fig. 4, lines 37-40 of column 7, and Equation (5)).

Therefore, the “torque filter” as presently claimed and the “actual assistive torque detecting means” of Shimizu are entirely different.

Further, the “degree of freedom” disclosed in Shimizu represents a physical-degree-of-freedom (i.e., degree-of-freedom-of-movement) of main inertia of the electric power steering system. For example, please refer to: “... a dynamic model whose degree of freedom is 2, of the motor and rack systems of the steering system” in lines 37-39 of column 11; and “In Fig. 11, the dynamic model is composed of a steering wheel system, a motor system and a rack system, with the degree of freedom being 3” in lines 57-59 of column 11.

² This rejection is believed to apply to claims 1-5 because the Examiner addresses each of these claims under this statement of rejection. Accordingly, Applicants respond as if this rejection applies to claims 1-5.

The “degree of freedom” as presently claimed is, as disclosed in paragraph [0039] for example, the degree of freedom for obtaining a control system for satisfying two characteristics at the same time by adjusting the steering feeling Gsf by tuning the torque filter and then adjusting the road information sensitivity Gds by tuning the SAT filter.

Therefore, the “degree of freedom” of Shimizu and that as presently claimed are entirely different.

Moreover, in Takeuchi, although an expression “reaction force on a road surface”, is used, Takeuchi discloses—in the specification, claims and abstract—actually, the result estimated by “estimation means”, that is, the result estimated in a “road surface μ estimation section” is a coefficient of friction on the road surface; it is not a “reaction force on a road surface”. That is, in the “road surface μ estimation section” of Takeuchi, the coefficient of friction on the road surface μ is estimated by comparing inputted speed and steering angle with standard values thereof memorized correspondingly to the inputted speed and steering angle. In the meantime, in Takeuchi, a “coefficient of friction on the road surface μ ” is simply called as a “road surface μ ”. Therefore, the “road surface μ ” is a frictional coefficient instead of a reaction force on a road surface.

Still further, a “weighted average processing”, as disclosed in lines 57-60 of column 19 of Takeuchi, is a filter for an estimated coefficient of friction on the road surface μ in order not to change suddenly by a noise.

On the other hand, the “SAT filter” as presently claimed is a filter for tuning the road information sensitivity Gds to preferable characteristics, as disclosed in paragraph [0039] for example.

Therefore, the “SAT filter” of the present invention and the “weighted average processing” of Takeuchi are entirely different.

In light of the above, even assuming that one of ordinary skill in the art were motivated to combine Shimizu and Takeuchi as suggested by the Examiner, any such combination would still not teach or suggest all of the elements as set forth and arranged in Applicants’ claim 1.

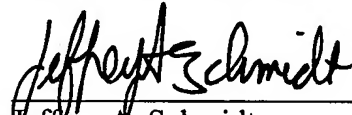
Accordingly, Shimizu and Takeuchi fail to render obvious Applicants' claim 1. Likewise, these references do not render obvious the dependent claims 2-4.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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